

This is a preview of "IEC 61280-2-8 Ed. 1....". Click here to purchase the full version from the ANSI store.

INTERNATIONAL STANDARD

IEC 61280-2-8

First edition
2003-02

Fibre optic communication subsystem test procedures – Digital systems

Part 2-8: Determination of low BER using Q-factor measurements

© IEC 2003 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

U

For price, see current catalogue

CONTENTS

FOREWORD	4
1 Scope	5
2 Definitions and abbreviated terms	5
2.1 Definitions	5
2.2 Abbreviations	5
3 Measurement of low bit-error ratios	6
3.1 General considerations	6
3.2 Background to Q-factor	7
4 Variable decision threshold method	9
4.1 Overview	9
4.2 Apparatus	12
4.3 Sampling and specimens	12
4.4 Procedure	12
4.5 Calculations and interpretation of results	13
4.6 Test documentation	17
4.7 Specification information	17
5 Variable optical threshold method.....	17
5.1 Overview	17
5.2 Apparatus	18
5.3 Items under test.....	18
5.4 Procedure for basic optical link	18
5.5 Procedure for self-contained system	19
5.6 Evaluation of results.....	20
Annex A (normative) Calculation of error bound in the value of Q	22
Annex B (informative) Sinusoidal interference method	24
Bibliography	30
Figure 1 – A sample eye diagram showing patterning effects	8
Figure 2 – A more accurate measurement technique using a DSO that samples the noise statistics between the eye centres	8
Figure 3 – Bit error ratio as a function of decision threshold level	10
Figure 4 – Plot of Q-factor as a function of threshold voltage	10
Figure 5 – Set-up for the variable decision threshold method	12
Figure 6 – Set-up of initial threshold level (approximately at the centre of the eye)	12
Figure 7 – Effect of optical bias	17
Figure 8 – Set-up for optical link or device test.....	19
Figure 9 – Set-up for system test	19
Figure 10 – Extrapolation of log BER as function of bias	21
Figure B.1 – Set-up for the sinusoidal interference method by optical injection	25
Figure B.2 – Set-up for the sinusoidal interference method by electrical injection	27
Figure B.3 – BER Result from the sinusoidal interference method (data points and extrapolated line).....	28
Figure B.4 – BER versus optical power for three methods	29

This is a preview of "IEC 61280-2-8 Ed. 1...". [Click here to purchase the full version from the ANSI store.](#)

Table 1 – Mean time for the accumulation of 15 errors as a function of BER and bit rate	6
Table 2 – BER as function of threshold voltage	14
Table 3 – f_i as a function of D_i	14
Table 4 – Values of linear regression constants	15
Table 5 – Mean and standard deviation.....	16
Table 6 – Example of optical bias test.....	20
Table B.1 – Results for sinusoidal injection	26

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FIBRE OPTIC COMMUNICATION SUBSYSTEM TEST PROCEDURES –
DIGITAL SYSTEMS –**

**Part 2-8: Determination of low BER
using Q-factor measurements**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organisation for standardisation comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardisation in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organisations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organisation for Standardisation (ISO) in accordance with conditions determined by agreement between the two organisations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61280-2-8 has been prepared by subcommittee 86C: Fibre optic systems and active devices, of IEC technical committee 86: Fibre optics.

The text of this standard is based on the following documents:

FDIS	Report on voting
86C/485/FDIS	86C/505/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until 2010. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

FIBRE OPTIC COMMUNICATION SUBSYSTEM TEST PROCEDURES – DIGITAL SYSTEMS –

Part 2-8: Determination of low BER using Q-factor measurements

1 Scope

This part of IEC 61280 specifies two main methods for the determination of low BER values by making accelerated measurements. These include the variable decision threshold method (Clause 4) and the variable optical threshold method (Clause 5). In addition, a third method, the sinusoidal interference method, is described in Annex B.

2 Definitions and abbreviated terms

2.1 Definitions

For the purposes of this document, the following terms and definitions apply.

2.1.1

amplified spontaneous emission

ASE

impairment generated in optical amplifiers

2.1.2

bit error ratio

BER

the number bits in error as a ratio of the total number of bits

2.1.3

intersymbol interference

ISI

mutual interference between symbols in a data stream, usually caused by non-linear effects and bandwidth limitations of the transmission path

2.1.4

Q-factor

Q

ratio of the difference between the mean voltage of the 1 and 0 rails, and the sum of their standard deviation values

2.2 Abbreviations

cw Continuous wave (normally referring to a sinusoidal wave form)

DC Direct current

DSO Digital sampling oscilloscope

DUT Device under test

PRBS Pseudo-random binary sequence